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Review Article

Navigating Telemedicine in the Middle Eastern Countries: A Scoping Review

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Abstract

Introduction: The COVID-19 pandemic has highlighted the urgent need for innovative healthcare solutions to address rapid population growth and healthcare service disparities, especially in resource-constrained settings. Telemedicine, which enables remote patient-provider communication and care, offers great potential to improve accessibility, efficiency, and quality of healthcare delivery. However, its development in Middle Eastern (ME) countries has been relatively slow and insufficiently monitored. This scoping review summarizes recent telemedicine implementations and their associated challenges in ME countries while offering recommendations for policymakers.

Methods: A search of Pubmed, Scopus, and Web of Science for articles published between January 2019 and August 2023 yielded 437 publications, of which 34 were included for data analysis. Study data were categorized using country of origin, study design, data collection methods, study subjects, telemedicine interventions, and major findings.

Results: The key insights highlight the need for integrating innovative technologies into healthcare systems, increasing public awareness and education on telemedicine, diversifying research to address regional priorities, and fostering interdisciplinary collaboration to accelerate telemedicine adoption.

Conclusion: In conclusion, while telemedicine has made significant progress in ME countries, ongoing challenges must be addressed to ensure equitable and effective healthcare delivery for all.

Keywords: telemedicine, Middle East, information and communication technology

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1. Introduction

The COVID-19 pandemic has highlighted the urgency for advancements in telemedicine, driven by the imbalance between healthcare needs and available resources, alongside the necessity of enforcing social distancing measures. Telemedicine utilizes information and communication technologies to exchange medical information and deliver clinical services to patients, aiming to improve their health outcomes regardless of their location [1]. Additionally, telemedicine facilitates ongoing medical education and enables interaction among healthcare professionals through teleconferences, research activities, and evaluations [2]. The utilization of telemedicine can be categorized into three main types based on the timing of information transmission: remote monitoring, real-time interactive services, and store-and-forward methods [3]. Remote monitoring, often referred to as patient self-monitoring, allows healthcare providers to remotely manage patients using various technological devices, commonly applied in the care of chronic conditions such as cardiovascular disease, diabetes mellitus, and obstructive pulmonary disease [4]. Real-time interactive services involve direct communication between patients and healthcare providers for consultations, medical history discussions, and devising patient management plans [5]. Conversely, store-and-forward techniques involve the transmission of medical data such as images, biosignals, and laboratory results using noninteractive technology to specialists who review the information at their convenience [6].

In developed countries, especially European countries, the effective integration of telemedicine has facilitated the widespread adoption of optimal healthcare practices [7]. However, the actual incorporation of telemedicine in developing regions such as Middle Eastern (ME) countries has remained slow despite advancements in adopting relevant information technology innovations, policies, and guidelines. The barriers to the implementation of telemedicine are related to their diverse and complex nature of political, financial, and socio-cultural considerations resistance from doctors and patients, inadequate infrastructure, limited funding, and a lack of technology training [8]. Considering the potential benefits of telemedicine contrasted with its limited adoption and success rates in developing nations, it is crucial to comprehend the factors influencing telemedicine progress in ME countries. Therefore, this scoping review aims to evaluate the current progress in using telemedicine in ME countries and discuss its future prospects. The outcome of this review can support policymakers in making informed decisions and developing effective strategies for telemedicine implementation across ME countries.

Although the review studies carried out by Mahmoud et al. [9], Abouzid et al. [2], and Al-Samarraie et al. [7], addressed the status of telemedicine in the ME, this scoping review represents an important knowledge gap by examining new developments that have taken place after 2020, with special attention to the COVID-19 pandemic context. This review provides new insights into diversified trends, challenges, and opportunities not covered in literature to a large extent. Given the highlighting of recent developments

and pointing out obstacles that still stand, this review is expected to help in setting future policy and practice responses to telemedicine across the region.

2. Methods

Further clarification was performed to outline the characteristics of studies applicable for this review. The styles of studies designed range from 18 descriptive studies that assess the rates of adoption and satisfaction with the use of telemedicine to 16 comparative studies that draw on the effectiveness of the telemedicine interventions compared to face-to-face interventions. Such a breakdown allows a better-informed analysis of the literature, on how different methodologies contribute to our knowledge regarding the impact telemedicine has in the ME.

2.1. Study Design

We conducted a scoping review following the methodological framework outlined by Arksey and O'Malley [10], aiming to systematically chart the existing literature on telemedicine utilization in ME countries. We adhered to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) checklist (Supplementary Figure 1) [11]. This approach was chosen for its ability to synthesize findings across various study types, offering a comprehensive overview of the topic. It also offers a quicker and more cost-effective alternative to a formal systematic review, allowing researchers to distill key insights from a diverse body of literature [12]. The protocol for this scoping review was not prospectively registered. Given the limited literature on telemedicine implementation in the ME region, we formulated our research question as: "What is the current status and progress of telemedicine implementation in the ME?"

2.2. Search Strategy

We searched multiple electronic databases: Pubmed, Scopus, and Web of Science within the same time frame, starting from January 2019 to August 2023. Notably, a medical subject heading (MeSH) term referring to telemedicine does not exist. Therefore, our search strategy was set up as follows: "telemedicine" or "telehealth" and "Middle Eastern countries". The ME countries considered in this study encompass Algeria, Egypt, Iran, Iraq, Israel, Jordan, Morocco, Palestine, Syria, Tunisia, Yemen, Turkey, Saudi Arabia, Oman, United Arab Emirates (UAE), Kuwait, Lebanon, and Palestine.

2.3. Study Eligibility

The study employed a set of inclusion criteria to identify eligible studies: 1) evaluation of any forms of telemedicine utilization within the ME context, 2) published in English, and 3) inclusion of quantitative research, qualitative studies, case reports, and case studies. These criteria encompassed a broad scope of telemedicine and telehealth definitions, covering various healthcare delivery methods facilitated by these technologies. This included real-time video conferencing, asynchronous store-and-forward systems, mHealth applications, and remote monitoring. We did not impose limitations on the type of participants involved in these studies. Literature reviews, systematic reviews, meta-analyses, and secondary analyses of original studies were excluded. Additionally, studies not directly relevant to telemedicine applications in the ME were also excluded, along with those inaccessible in full-text format.

2.4. Study Selection

Articles retrieved from the search were exported to EndNote, where duplicates were removed. A thorough screening process was then conducted to evaluate the titles, abstracts, and full texts. Potentially relevant papers were retrieved and organized within a designated subgroup within Endnote for further assessment. Throughout the full-text assessment, exclusion criteria were documented to ensure a transparent selection process.

2.5. Data Extraction

The initial data charting process was piloted with five studies to ensure alignment with the study's objectives, followed by adjustments, as necessary. Study data were then categorized across key fields, including country of origin, study design, data collection methods, study subjects, telemedicine interventions, and major study findings. Emphasis was given to accurately capturing the reported outcomes, which were crucial for understanding the diverse impacts of the interventions. The term "impact" was defined broadly, covering cognitive factors such as beliefs and knowledge, behavioral aspects such as prescription patterns and self-management practices, and clinical outcomes including physiological measures. It is worth noting that a formal assessment of methodological quality or risk of bias was not conducted, as the primary focus was on summarizing key elements such as study design, theoretical frameworks, and the comprehensiveness of intervention descriptions.

2.6. Data Analysis

Our data analysis aimed to identify correlations between implementation strategies and the resulting outcomes or impacts. The findings are presented based on regional categorization, highlighting studies

from various countries within the region. We began with a comprehensive numerical analysis, covering study characteristics such as research design, methodologies employed, types of interventions, and the geographical distribution of the included studies. This approach offered valuable insights into the prevalent research areas, intervention types, commonly utilized methodologies, and regional representation. Through this analysis, we identified key areas of focus and notable gaps in the existing literature.

3. Results

The initial database search identified 437 references. After deduplication, 412 references were eligible for title/abstract screening. The title/abstract screening resulted in 132 full-text articles; of which, 34 original articles originating from Saudi Arabia (*n* = 10), Oman (*n* = 2), Kuwait (*n* = 2), Israel (*n* = 6), Turkey (*n* = 4), Iran (*n* = 6), Iraq (*n* = 1), Qatar (*n* = 2), the UAE (*n* = 1), and the ME (*n* = 1) were selected. Figure **1** provides an overview of the article selection process, while Table **1** summarizes the key findings from the selected papers in this review.

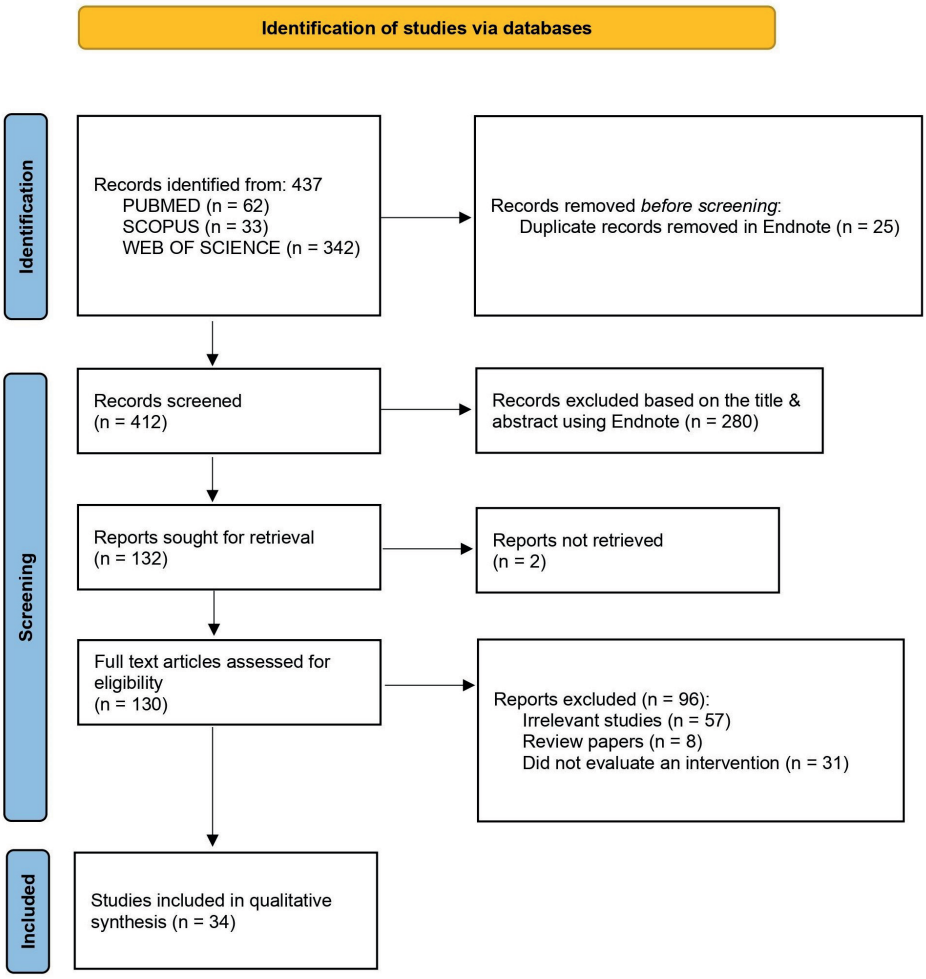

Figure 1: Navigating telemedicine in the ME countries [PRISMA flow diagram].

Table 1: Summary of the selected papers.

Country	Study design	Data collection methods/ study subjects	Telemedicine intervention	Major study findings	References
Saudi Arabia	Longitudinal study	Document analysis/adults with diabetes (≥ 14 years old)	Diabetes Telemedicine Clinic via Zoom and FaceTime	• Streamlined telemedicine consultations, including real-time audio calls, proved to be just as effective as in-person visits in enhancing glycemic control among diabetic patients. • Telemedicine utilization was lower among older patients and individuals with type 2 diabetes.	[13]
	Retrospective analysis	Document analysis/ individuals with type 1 diabetes	Diabetes Telemedicine Clinic	• Individuals who participated in a telemedicine visit during the lockdown period experienced a significant improvement in their continuous glucose monitoring by the end of the lockdown.	[14]
	Retrospective cross-sectional study	Document analysis/ palliative care patients	Teleclinic	• Telemedicine has garnered growing acceptance among patients receiving palliative care.	[15]
	Retrospective study	Questionnaire/ adult patients who were scheduled in the rhinology clinics	Telemedicine via phone calls	• A majority of respondents (83.3%) expressed satisfaction with telemedicine services.	[16]
	Cross-sectional study	Questionnaire/ mHealth user	mHealth applications	• Users provided moderately high ratings to mHealth applications for their ease of use, information retrieval, and app interface. • Identified concerns include challenges in recovering from errors while using the applications, navigation inconsistencies, and a lack of essential functions.	[17]
	Cross-sectional study	Online survey/ e-health application users and non-users	e-health application, Seha	• Seha users showed higher mean scores in terms of the ease of accessing health services, satisfaction with health services, and efficiency (requiring only a single visit)	[18]
	Cross-sectional study	Questionnaire/ patients	Virtual clinics	• 68.1% of patients expressed satisfaction with virtual clinics. • Among virtual clinics, family medicine clinics received the highest attendance, while obstetrics and gynecology clinics had the lowest attendance rates. • The inability to have face-to-face interactions with healthcare professionals was identified as the most important drawback by 53.8% of respondents.	[19]
	Cross-sectional study	Questionnaire/ physicians	Telehealth services	• 57.6% of physicians believed that telemedicine reduced their travel time, with 59.6% stating that it enhanced their job effectiveness and performance. • 58.9% noted that telemedicine allowed them to complete tasks more efficiently, increasing their overall productivity. • A majority, 61.6%, considered telemedicine to be important to their practice. • 53.6% expressed a preference for telemedicine due to the alignment of participants' values with the societal values underpinning its usage.	[20]

Table 1: Continued.

Country	Study design	Data collection methods/ study subjects	Telemedicine intervention	Major study findings	References
	Quantitative and qualitative study	Questionnaire/ telehealth service users	Telehealth services, Sehhaty application	• The Sehhaty application had a high acceptance rate among users, with an overall satisfaction level of 76.36%. • Among participants, 44.34% expressed a preference for using the Sehhaty application, while a total of 68.87% still prefer in-person visits.	[21]
	Retrospective cohort study	Document analysis/high-risk COVID-19 patients	Family medicine-led telemedicine service telemonitoring program	• No differences were observed in terms of oxygen requirements, intubation rates, and intensive care unit admissions between the telemedicine group and the control group. • The telemedicine service led by family medicine practitioners resulted in a remarkable reduction of 77% inpatient admissions, along with an average decrease of 4.4 hospital stays and savings of $3400 per patient on average.	[22]
Oman	Qualitative research based on an interpretative phenomenological analysis	Interview/ physicians who actively conduct telephone consultations in primary health care	Telephone consultation	• Identified challenges encompass limited staff training for telephone consultations, suboptimal patient-physician interactions, insufficient technical support, privacy and confidentiality concerns, and documentation issues. • Telephone consultations proved more effective in managing COVID-19 cases, chronic conditions, and antenatal care, as well as general and emergency cases. • Physicians noted a decrease in the overcrowding of primary healthcare facilities and a reduced risk of acquiring COVID-19 and other infections.	[23]
Kuwait	Retrospective cohort study	Document analysis/ pediatric patients	Telehealth Antimicrobial Stewardship Program	• Implementation of a telehealth antimicrobial stewardship program resulted in an overall reduction in therapy duration. • There was no observed impact on the length of stay in pediatric intensive care units, the duration of hospitalization, or mortality rates.	[24]
	Cross-sectional study	Questionnaire/ general population	Telehealth	• Among the participants, 65% displayed a high level of acceptance toward telehealth, with 73.5% expressing comfort in using it and 48.2% perceiving themselves as capable of utilizing its systems. • Participants who scored moderate or high in terms of comfort and those who believed they received equivalent quality of care during virtual visits were more inclined to accept virtual calls from their healthcare providers.	[25]
Israel	Cross-sectional study	Questionnaire/ primary care physicians and medical specialists	Telemedicine via phone calls, WhatsApp and Facebook	• Primary concerns voiced by physicians using the application included increased workload, potential breaches of patient confidentiality, and incomplete documentation of consultations. • Telemedicine helps reduce the necessity for in-person appointments to at least once a week.	[26]
	Cross-sectional study	Questionnaire/ patients and clinicians	Video consultations	• Over 80% of patients expressed satisfaction toward video consultations. • Clinician satisfaction levels were lower at 37.7%, primarily attributed to technical and administrative challenges.	[27]

Table 1: Continued.

Country	Study design	Data collection methods/ study subjects	Telemedicine intervention	Major study findings	References
	Cross-sectional study	Questionnaire/ patients and clinicians from a primary medicine clinic	Telemedicine	• While the majority of participants (85%) were knowledgeable about using the internet for health information, only one-third felt confident using it to make health decisions. • Telemedicine consultations or treatment sessions were utilized by only 38% of the participants. • A positive association was observed between eHealth literacy and satisfaction variables related to the use of telemedicine.	[28]
	Cross-sectional study	Questionnaire/ pediatricians	Telemedicine via phone calls, emails, text messages, pictures or video clips via mobile phone, videoconferencing via Zoom or FaceTime	• Significant increases in the daily use of text messages, pictures, and videoconferencing during the COVID-19 lockdown, with projected decreases in text message and picture usage post-pandemic. • The likelihood of treating suspected pneumonia or prescribing antibiotics for suspected otitis media via telemedicine was anticipated to decrease significantly during the lockdown. • Maccabi administrative data revealed a notable shift toward phone visits during the lockdown, with a partial return to baseline levels of in-person visits and sustained use of phone visits one month after the lockdown relaxation.	[29]
	Cross-sectional study	Questionnaire/ clinical dietitians	Virtual nutrition consultation via phone, Zoom, WhatsApp, Skype, Messenger, Google Meet, Microsoft Teams, and Unicko	• The majority of respondents (57%) lacked prior experience in conducting consultations over the phone. • Alternative nutrition counseling was perceived as less effective compared to face-to-face consultations. • Reported difficulties included technical issues, the absence of anthropometric measurements, and challenges in interpersonal communication. • Older age and previous phone counseling experience were positively associated with higher quality counseling scores.	[30]
	Cross-sectional study	Questionnaire/ obese patients	Telemedicine	• Telemedicine was associated with an increased likelihood of patients losing weight and engaging in regular exercise.	[31]
Turkey	Convergent parallel mixed-method research (quantitative and qualitative)	Document analysis/ clinicians and stuttering adults	Telepractice	• Telepractice is as effective as the in-person method for service delivery.	[32]
	Case report	Document analysis/new-onset pediatric type 1 diabetes patients	Telemedicine via email and WhatsApp	• Telemedicine allows for the achievement of optimal glycemic targets in pediatric patients with newly diagnosed type 1 diabetes. • Key limitations of telehealth systems include the inability to conduct physical examinations and the absence of point-of-care testing for accurate HbA1c measurement.	[33]
	Prospective cross-sectional study	Questionnaire/ pediatric patients and the involved physicians	Telemedicine	• Telemedicine received high satisfaction ratings from both patients (99%) and physicians (87%). • Patients primarily appreciated the main advantage of telemedicine as “eliminating the need for transportation.” • The main concerns expressed by participants revolved around the inability to conduct physical and laboratory examinations.	[34]

Table 1: Continued.

Country	Study design	Data collection methods/ study subjects	Telemedicine intervention	Major study findings	References
	Cross-sectional study	Questionnaire/ radiologists	Teleradiology	• Nearly half of the participants (49%) exclusively conducted teleradiology work in the private sector. • Half of the respondents (51%) indicated that they reported images for multiple centers while working from home. • 38% of the participants reported more than 50 examinations per day, and 74% of the respondents earned < 0.50 € for each examination they reported. • On average, teleradiologists expressed a satisfaction rating of 4.7 out of 10 points about their teleradiology work.	[35]
Iran	Interventional and descriptive-analytic study	Document analysis/ stuttering patients	Tele-speech therapy via Skype	• An average reduction of 13.8% in stuttering severity was observed following tele-speech therapy. • Tele-speech therapy received high satisfaction, with over half of the patients (56.6%) expressing contentment.	[36]
	Cross-sectional study	Questionnaire/ patients	Store-and-forward voice & text messaging teleconsultation service	• Teleconsultation received a satisfactory rating from 43.43% of patients, while over half of them (56.57%) expressed dissatisfaction with the service. • Approximately 41% of patients reported satisfaction with the "quality of care provided" and "patient information privacy" aspects.	[37]
	Community-based randomized trial	Digital data analysis/ Iranian citizens	mHealth screening program for eye care utilization	• During the initial 3 months following the screening program, individuals referred through the mHealth method exhibited higher eye care utilization compared to those referred through the conventional method, as well as individuals in the control group where manual data collection without screening tests was employed. • There was an enhancement in eye care utilization among those referred after the screening program, compared to their utilization before the program. However, this improvement was notably more pronounced with the mHealth method than with the conventional method.	[38]
	Quasi-experimental study	Questionnaire/ patients with myocardial infarction	Telenursing	• Telenursing enhanced adherence to the treatment program and promoted patients' self-efficacy.	[39]
	Cross-sectional study	Questionnaire/ asthma patients	mHealth via smartphone applications and E-mail	• Fewer than half of the participants sporadically utilized mobile phone features, such as phone calls (42.5%) and mobile Internet (40.4%), to access asthma-related information. • The participants primarily relied on Internet searches, followed by social media, to obtain information about various aspects of asthma, including symptoms, allergenic and irritating substances (43.2%), medicinal therapy (39.7%), and the proper use of therapy aids (35.6%).	[40]
	Randomized clinical trial	Questionnaire/ patients with heart failure	Tele-monitoring	• Tele-monitoring enhanced self-care behaviors in patients with heart failure but did not result in reduced readmission rates over 3 months.	[41]

Table 1: Continued.

Country	Study design	Data collection methods/ study subjects	Telemedicine intervention	Major study findings	References
Iraq	Multicenter cross-sectional study	Questionnaire/ healthcare providers	Telehealth services via Messenger/ Facebook and WhatsApp applications	• Participants generally agreed on the usability of telehealth services, with an overall mean score of 4.8. • The most frequently reported barriers to accessing telehealth services included inadequate Internet connectivity, the presence of specific medical conditions, limited technical understanding, and insufficient time allocated for the service.	[42]
Qatar	Descriptive and qualitative study	Face-to-face focus group discussions/ clinical pharmacists	Telepharmacy	• Clinical pharmacists reported a lack of preparedness for telepharmacy practice. • Telepharmacy offers several advantages, including reduced risk of infection exposure, improved quality of care, increased patient satisfaction, and improved workplace efficiency and productivity. • The primary risks associated with telepharmacy center on potential breaches of patient confidentiality missed pharmaceutical care opportunities, and potential negative impacts on professional relationships with other healthcare providers. • Major challenges include low digital health literacy, complex illnesses and medication regimens, absence of standardized protocols, resource inadequacy, and cultural resistance to virtual care.	[43]
	Qualitative study	Semi-structured interview/ healthcare practitioners	Telepharmacy services	• Healthcare professionals perceived the remote clinical pharmacist's responses to drug-related inquiries as satisfactory. • The remote clinical pharmacist had a significant impact on both direct patient care and quality improvement projects. • Challenges in patient care included a high patient load, inevitable delays in electronic documentation, and the complexities of communication due to COVID-19 precautions.	[44]
UAE	Prospective observational study	Document analysis/ community pharmacies	Telepharmacy services	• Pharmacist recommendations regarding COVID-19 in pharmacies with telepharmacy services, as opposed to those without remote services, were significantly more inclined towards advising patients to contact the nearest testing center, adhere to home quarantine measures, and consider using paracetamol for fever. • Pharmacies equipped with telepharmacy demonstrated significantly lower incidence rates of medication dispensing errors, including prescription-related errors and pharmacist counseling errors, in comparison to those without remote services.	[45]
Middle east	Cross-sectional study	Questionnaire/ residents from all Arab countries	Telehealth via message, phone call, and video	• Telehealth usage experienced a substantial surge of 251% during the COVID-19 pandemic, with 36.8% expressing their intention to continue using telehealth services post pandemic. • Approximately 89% of telehealth users opted for virtual visits, particularly for specialist consultations. • In contrast, respondents who utilized both messaging and phone calls for telehealth were noticeably less inclined to recommend telehealth services. • Overall, respondents expressed a high level of satisfaction with telehealth, highlighting that telehealth consultations enhanced their sense of safety and resulted in time and cost savings.	[46]

The results have been reorganized to provide more detailed categorizations of the reviewed studies. Instead of simply classifying them by country, studies are now categorized in more detail, including study design, medical specialty, type of telemedicine utilized, and specific challenges or benefits observed. This approach allows for a more in-depth analysis of how telemedicine is applied in diverse contexts, such as managing chronic conditions through real-time interactive services or addressing specific challenges in rural areas. This, in turn, provides better clarification of the role that telemedicine has played and can continue to play in different settings across the ME.

3.1. Saudi Arabia

Al-Sofiani et al. demonstrated the effectiveness of a streamlined telemedicine clinic through Zoom and FaceTime in improving glycemic control among diabetic patients, showing comparable outcomes to in-person visits [13]. Notably, telemedicine utilization was lower among older patients and those with type 2 diabetes. Similarly, Alharthi et al. revealed significant improvement in continuous glucose monitoring among type 1 diabetic patients who participated in telemedicine visits during the COVID-19 lockdown [14].

Almouaalamy et al. reported a growing acceptance of teleclinics among palliative care patients [15]. Similarly, Alshareef et al. found that a majority of respondents (83.3%) expressed satisfaction with telemedicine services delivered via phone calls [16].

Alanzi et al. demonstrated high user ratings of mHealth applications, citing their ease of use, information retrieval, and user-friendly interfaces [17]. However, users identified concerns, including challenges in recovering from application errors, navigating inconsistencies, and missing essential functions. Alharbi et al. reported high scores for ease of accessing health services, satisfaction with health services, and efficiency, all achievable through a single visit using an e-health application called Seha [18]. In another study by Alharbi et al., 68.1% of patients expressed satisfaction with virtual clinics, with family medicine clinics having the highest attendance rates and obstetrics and gynecology clinics reporting the lowest attendance [19]. Notably, 53.8% of respondents identified the inability to have face-to-face interactions with healthcare professionals as a significant drawback.

Alqahtani et al. demonstrated that telehealth services reduced physicians' travel time by 57.6% and improved job effectiveness for 59.6% of participants [20]. Furthermore, 58.9% noted that telemedicine allowed them to complete tasks more efficiently, leading to an increase in overall productivity. A majority, 61.6%, considered telemedicine important to their practice, with 53.6% expressing a preference for telemedicine due to alignment with societal values.

Dawood et al. reported a high acceptance rate of the telehealth services provided through the Sehhaty application, with an overall satisfaction rate of 76.36% [21]. While 44.34% of participants preferred using the Sehhaty application, 68.87% still favored in-person visits.

Khalid et al. found in their study that the telemonitoring program, overseen by family medicine practitioners, showed no significant differences in oxygen requirements, intubation rates, or admissions to the intensive care unit between the telemedicine test group and the control group [22]. However, the telemedicine service resulted in a significant 77% decrease in inpatient admissions, along with an average reduction of 4.4 hospital stays per patient, resulting in average savings of $3400 per patient.

3.2. Oman

Al Hasani et al. emphasized the effectiveness of telephone consultations in addressing various healthcare needs, including COVID-19 cases, chronic conditions, antenatal care, as well as general and emergency cases [23]. Physicians recognized several benefits, including reduced overcrowding in primary healthcare facilities and a lowered risk of contracting COVID-19 and other infections. However, they also noted challenges, including inadequate staff training for telephone consultations, suboptimal patient-physician interactions, limited technical support, concerns regarding privacy and confidentiality, and challenges with documentation.

3.3. Kuwait

Alfraij et al. demonstrated that the implementation of a telehealth antimicrobial stewardship program led to an overall reduction in therapy duration [24]. However, no significant impact was observed on the lengths of stay in pediatric intensive care units, hospitalization durations, or mortality rates. In another study by AlMatar et al., it was found that 65% of the general population had a high level of acceptance toward telehealth, with 73.5% expressing comfort in its use and 48.2% feeling capable of utilizing its systems [25]. Participants who reported moderate to high levels of comfort and those perceiving equivalent quality of care during virtual visits were more inclined to accept virtual calls from their healthcare providers.

3.4. Israel

Barayev et al. found that telemedicine services utilizing phone calls, WhatsApp, and Facebook minimized the need for in-person appointments to a frequency of at least once per week [26]. Primary care physicians and medical specialists voiced concerns regarding the application, citing increased workloads, potential breaches of patient confidentiality, and incomplete documentation of consultations as primary issues.

Barkai et al. reported that over 80% of patients expressed satisfaction with video consultations, whereas clinician satisfaction levels were lower at 37.7%, primarily attributed to technical and administrative challenges [27]. Similarly, Dopelt et al. found that telemedicine consultations or treatment sessions were utilized by only 38% of the participants [28]. Although the majority (85%) were knowledgeable about

using the internet for health information, only one-third felt confident in making health decisions based on online resources. The study also found a positive correlation between eHealth literacy and satisfaction with telemedicine usage.

Grossman et al. identified a significant increase in the daily use of text messages, pictures, and videoconferencing during the COVID-19 lockdown, with expected decrease in text message and picture usage post pandemic [29]. The likelihood of managing suspected pneumonia or prescribing antibiotics for suspected otitis media via telemedicine was projected to decrease notably during the lockdown period. Maccabi administrative data indicated a notable shift toward phone visits during the lockdown, with a partial return to baseline levels of in-person visits and continued use of phone visits, one-month post-lockdown relaxation. Positive feedback was also reported by Minsky et al., in which telemedicine was associated with an increased likelihood of obese patients losing weight and engaging in regular exercise [30].

In a study by Kaufman-Shriqui et al., the majority of clinical dietitians (57%) lacked prior experience in conducting consultations over the phone via phone, Zoom, WhatsApp, Skype, Messenger, Google Meet, Microsoft Teams, and Unicko [31]. Alternative nutrition counseling was perceived as less effective compared to face-to-face consultations. Reported difficulties included technical issues, the absence of anthropometric measurements, and challenges in interpersonal communication. Older age and previous phone counseling experience were positively linked to higher quality scores in counseling sessions.

3.5. Turkey

Cangi and Toğram found that telepractice is equally effective as in-person methods for delivering services to patients with stuttering [32]. A study by Evin et al. revealed that telemedicine through email and WhatsApp allowed for the achievement of optimal glycemic targets in pediatric patients with newly diagnosed type 1 diabetes [33]. Limitations of telehealth systems include the inability to perform physical examinations and the lack of point-of-care testing for precise HbA1c measurements.

Aydemir et al. showed high satisfaction ratings of telemedicine from both patients (99%) and physicians (87%) [34]. Patients primarily appreciated the main advantage of telemedicine as “eliminating the need for transportation.” The main concerns expressed by participants revolved around the inability to conduct physical and laboratory examinations.

Dicle et al. highlighted that over half of the radiologists (51%) reported analyzing images for multiple centers while working remotely [35]. Nearly half of the participants (49%) exclusively performed teleradiology work in the private sector. 38% of the respondents reported handling more than 50 examinations daily, with 74% earning < 0.50 € per examination. On average, teleradiologists rated their satisfaction with teleradiology work at 4.7 out of 10 points.

3.6. Iran

Eslami Jahromi et al. showed an average decrease of 13.8% in severity of stuttering in patients receiving tele-speech therapy through Skype [36]. Tele-speech therapy received high satisfaction, with over half of the patients (56.6%) expressing contentment.

Jannati et al. reported that store-and-forward teleconsultation service using voice and text messaging received a satisfactory rating from 43.43% of patients, while the majority (56.57%) expressed dissatisfaction with the service [37]. Approximately 41% of patients reported satisfaction with the "quality of care provided" and "patient information privacy" aspects.

Katibeh et al. found that individuals referred through the mHealth method showed increased utilization of eye care compared to those referred through the conventional means, as well as individuals in the control group where manual data collection without screening tests was used during the initial 3 months, following the mHealth screening program [38]. There was an improvement in eye care utilization among those referred after the screening program, compared to their utilization before the program. However, the increase was notably more pronounced with the mHealth method than with conventional.

Keshavaraz et al. demonstrated that telenursing enhanced adherence to treatment programs and boosted patients' self-efficacy [39]. In a study by Negarandeh et al., telemonitoring enhanced self-care behaviors in heart failure patients but did not lead to reduced readmission rates over 3 months [40].

Nabovati et al. found that less than half of the participants occasionally used mobile phone features like phone calls (42.5%) and mobile Internet (40.4%) to access asthma-related information [41]. The participants mainly depended on Internet searches, followed by social media, to obtain information on different aspects of asthma, including symptoms, allergens and irritants (43.2%), medication therapy (39.7%), and the correct use of therapy devices (35.6%).

3.7. Iraq

Kasim et al. reported that participants generally found telehealth services accessible through Messenger/Facebook and WhatsApp applications, with an average score of 4.8 [42]. Commonly cited barriers to accessing these services included inadequate Internet connectivity, specific medical conditions, limited technical understanding, and insufficient allocated time for the service.

3.8. Qatar

Alhmoud et al. highlighted that clinical pharmacists' have reported unpreparedness for telepharmacy practice [43]. Despite this, telepharmacy offers benefits such as reduced infection exposure, enhanced care quality, heightened patient satisfaction, and improved workplace efficiency. Risks associated with

telepharmacy include potential breaches of patient confidentiality, missed pharmaceutical care opportunities, and impacts on professional relationships with other healthcare providers. Challenges encompass low digital health literacy, complex illnesses and medications, absence of standardized protocols, resource scarcity, and cultural resistance to virtual care. Similarly, Isleem et al. found significant impacts of telepharmacy on direct patient care and quality improvement initiatives [44]. Healthcare professionals perceived remote clinical pharmacists' responses to drug-related inquiries as satisfactory. Challenges in patient care included a heavy patient load, delays in electronic documentation, and communication complexities due to COVID-19 precautions.

3.9. UAE

Mohamed Ibrahim et al. observed a substantial decrease in medication dispensing errors, particularly prescription-related and counseling errors, in pharmacies with telepharmacy services compared to those lacking remote services [45]. Moreover, pharmacist recommendations concerning COVID-19 in pharmacies with telepharmacy emphasized actions such as directing patients to testing centers, adhering to home quarantine, and considering paracetamol for fever, contrasting with pharmacies lacking such remote services.

The study conducted by Shamiyah et al. across Arab countries indicated a substantial increase in telehealth usage, including messaging, phone calls, and video services, with a notable surge of 251% during the COVID-19 pandemic [46]. Post-pandemic, 36.8% of participants expressed their intent to continue utilizing telehealth services. Particularly, 89% of telehealth users preferred virtual visits, especially for specialist consultations. However, those who used messaging and phone calls for telehealth were less likely to recommend these services. Overall, respondents reported high satisfaction, noting that telehealth consultations not only increased their sense of safety but also saved significant time and costs.

4. Discussion

The discussion has been expanded to include some major concepts under-represented, including the platforms of telemedicine employed and the socio-cultural challenges affecting telemedicine's adoption in the ME. For example, there is massive use of mHealth applications in countries such as Saudi Arabia and Qatar, thus providing an easy-to-use interface where there are remote consultations. However, considerable barriers are still observed ranging from resistance to digital health interventions among older populations to rural areas. Such challenges need to be resolved through targeted education and improved levels of digital literacy in order to make telemedicine successful throughout this region.

This review presents an extensive compilation of telemedicine interventions across the ME, with Saudi Arabia, Israel, Iran, and Turkey leading in their utilization, while Oman, Kuwait, Iraq, Qatar, and the UAE have

reported limited implementation. Notably, Saudi Arabia has shown a growing acceptance of telemedicine, exemplified by studies like Al-Sofiani et al. highlighting its effectiveness in glycemic control for diabetic patients, adding its viability as an alternative to in-person visits [13]. However, they also noted lower utilization among older patients and those with type 2 diabetes, indicating potential challenges in reaching certain demographics.

A similar trend was observed in other studies from Saudi Arabia. Almouaalamy et al. reported the increasing acceptance of teleclinics among palliative care patients, underscoring the relevance of telehealth in various medical specialties [15]. Alshareef et al. found a majority expressing satisfaction with telemedicine services via phone calls, indicating its feasibility for remote healthcare delivery [16]. Alanzi highlighted high user ratings of mHealth applications, reflecting their user-friendly interfaces [17]. Still, users identified concerns regarding application errors and navigation issues. These findings suggest a growing acceptance of telemedicine in Saudi Arabia, yet underscoring the need to address barriers such as age-related disparities, technical hurdles, and usability concerns to ensure equitable access and usability.

Although challenges related to staff training and privacy concerns persist, telephone consultations have shown efficacy in managing diverse healthcare needs in Oman, particularly during the COVID-19 pandemic [23]. In Kuwait, the implementation of a telehealth antimicrobial stewardship program has garnered overall acceptance [24]. Notably, individuals who reported comfort with virtual visits and perceived equivalent quality of care were more inclined to embrace telehealth as a healthcare delivery mode. These findings highlight the potential of telemedicine to gain broad acceptance, particularly when patients view it as a viable and effective alternative to traditional in-person care, even if clinical outcomes do not exhibit substantial changes.

Israel has seen success in reducing the necessity for in-person appointments, but clinicians faced challenges such as increased workloads and technical issues. This highlights the importance of addressing technical and administrative challenges and ensuring secure and efficient telehealth platforms. Turkey has reported high satisfaction among patients and physicians, particularly appreciating the elimination of the need for transportation, but the inability to conduct physical examinations remains a limitation.

Iran has shown success in varying levels of telehealth applications, such as speech therapy and eye care, but mixed satisfaction ratings for store-and-forward teleconsultations. Iraq has reported generally positive usability of telehealth services but identified barriers related to inadequate internet connectivity and limited technical understanding. These findings underscore the need for targeted efforts to address connectivity issues and enhance digital literacy, thereby improving the accessibility and effectiveness of telemedicine in Iraq, especially in regions facing infrastructural challenges.

In Qatar, implementation of telepharmacy has encountered challenges related to pharmacist readiness, yet it presents advantages such as decreased infection exposure and enhanced patient satisfaction. Key obstacles include limited digital health literacy, intricate patient conditions and treatments, the

absence of standardized telepharmacy protocols, resource limitations, and cultural reluctance toward virtual care [43, 44]. These hurdles must be addressed to fully leverage the benefits of telepharmacy within Qatar's healthcare framework, particularly considering the shifting demands stemming from the COVID-19 pandemic. Likewise, the potential of telepharmacy in the UAE has not only bolstered the quality of pharmaceutical care but has also contributed to public health initiatives during the pandemic [45]. This review underscores the diverse landscape of telemedicine integration and emphasizes the necessity of addressing specific challenges to enhance its accessibility and effectiveness in these healthcare systems.

In this paper, information has been combined to avoid redundancy, further coherence, and ease of reading. For instance, each article has repeatedly mentioned remote monitoring, real-time interactive services, and store-and-forward methods as the different types of telemedicine. This information is subsumed into the introductory section which will provide a broad and clear description of the benefits and applications of those methods without repetitions. A similar consolidation has been done for other repeated content, ensuring that key points are presented in a more focused and direct manner.

A possible limitation could be to not conducting a systematic assessment of methodological quality, as it is not a mandatory requirement for a scoping review. We acknowledge that a formal evaluation of the methodological quality or risk of bias for the included studies was not undertaken, and thus the robustness and reliability of the findings reported in these studies were not critically appraised.

5. Future Prospects

Telemedicine with its evident benefits, is predicted to become an integral component of healthcare services, and its exponential growth is anticipated, fueled by the proliferation of interconnected healthcare devices and the advent of high-speed 5G internet in telecommunications [47]. The findings of this study underscore the promising potential of telehealth and telemedicine services in the ME, offering opportunities to enhance healthcare accessibility, streamline operations, and achieve substantial cost savings. However, realizing these benefits effectively requires a comprehensive approach to address the identified challenges.

Recommendations include the need for better dissemination of information regarding telemedicine research and development through national programs designed to educate and train healthcare professionals and increase public awareness [3]. Initiatives to enhance eHealth literacy and raise awareness about the advantages and limitations of telehealth can empower both patients and healthcare providers. Moreover, rigorous research and evaluation are vital to thoroughly assess the lasting effects of telehealth on healthcare outcomes and its cost-effectiveness within the ME context.

Telemedicine technologies are expected to become more integrated into patients' daily care through various technological models [48]. Hence, strategies aimed at reducing disparities in telehealth utilization across diverse patient demographics, particularly among older individuals and those with specific health

conditions, are imperative. Additionally, improving the usability of telehealth platforms and providing extensive training for healthcare professionals and patients will be pivotal in enhancing the overall telehealth experience. Stringent security measures must be implemented to safeguard patient data and maintain utmost confidentiality [2, 7]. Prioritizing these multifaceted strategies can enable the ME to harness the full potential of telehealth, advancing healthcare services and benefiting its population.

6. Conclusion

In conclusion, ME countries have made notable progress in incorporating telemedicine and telehealth services into their healthcare systems. While studies show positive outcomes and user satisfaction, persistent challenges in terms of accessibility, user training, technical issues, and privacy concerns need to be addressed as telehealth initiatives expand. These challenges are pivotal in ensuring equitable and effective healthcare delivery in the region.

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Statements

This review research is based solely on published studies. Ethical approval is not required in accordance with the Dubai Healthy Authority Ethics Committee policies.

Statement of Ethics

An ethics statement is not applicable because this study is based exclusively on published literature.

Conflict of Interest Statement

The authors have no conflicts of interest to declare.

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Author Contributions

Alanood Abdulla Saeed Rabeea Alnaqbi – literature search and drafting the original manuscript; Amanda Shen-Yee Kong – conceptualization, data collection and editing the manuscript; Manal Omar Awadh Musaad Alhelali, Lateef Olayanju, Hamzeh Awad, Kok Song Lai, Tsepang Nare – manuscript correction and supervision of the manuscript. All authors read and approved the final manuscript.

Data Availability Statement

All data generated during this scoping review are included in this article. Further inquiries can be directed to the corresponding author.

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